

# Key to the *Macrophya sanguinolenta* group (Hymenoptera: Tenthredinidae) with descriptions of four new species from China

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**Abstract:** When the *Macrophya sanguinolenta* group was first proposed, it included four species subgroups: the *M. depressina* subgroup, the *M. koreana* subgroup, the *M. sanguinolenta* subgroup, and the *M. tongi* subgroup by Wei *et al.* in 2013. Four new species, *Macrophya pseudominutiluna* Liu, Li & Wei **sp. nov.**, *M. pseudopentanalina* Liu, Li & Wei **sp. nov.**, *M. qiliweii* Liu, Li & Wei **sp. nov.**, and *M. zhangae* Liu, Li & Wei **sp. nov.** from China are described in this work. A key to all Chinese species and a geographical distribution map of the *M. sanguinolenta* group in China are provided.

**Key words:** sawflies; Tenthredinoidea; taxonomy; key

## 中国血红钩瓣叶蜂种团四新种暨分种检索表（膜翅目：叶蜂科）

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**摘要:** 血红钩瓣叶蜂种团 *Macrophya sanguinolenta* group 于 2013 年首次被提出, 包括四个亚种团: 凹颜钩瓣叶蜂亚种团 *M. depressina* subgroup、朝鲜钩瓣叶蜂亚种团 *M. koreana* subgroup、血红钩瓣叶蜂亚种团 *M. sanguinolenta* subgroup 和童氏钩瓣叶蜂亚种团 *M. tongi* subgroup。在本研究内, 记述中国钩瓣叶蜂属 4 新种: 拟点斑钩瓣叶蜂 *Macrophya pseudominutiluna* Liu, Li & Wei **sp. nov.**, 拟五斑钩瓣叶蜂 *M. pseudopentanalina* Liu, Li & Wei **sp. nov.**, 立威钩瓣叶蜂 *M. qiliweii* Liu, Li & Wei **sp. nov.** 和张氏钩瓣叶蜂 *M. zhangae* Liu, Li & Wei **sp. nov.**。还提供了中国血红钩瓣叶蜂种团分种检索表和地理分布图。

**关键词:** 叶蜂; 叶蜂总科; 分类; 检索表

## Introduction

*Macrophya* Dahlbom, 1835 is the third largest genus in the subfamily Tenthredininae (Hymenoptera: Tenthredinidae). It contains 316 species worldwide, of which 179 have been recorded in China up to November 2022 (Li *et al.* 2019a, b; Liu *et al.* 2019a, b, c, 2021).

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The genus *Macrophya* includes 27 groups worldwide for now (Li *et al.* 2014a). A key to all species groups of *Macrophya* worldwide has been provided and 20 species groups in China have been reported (Li *et al.* 2018). The *Macrophya sanguinolenta* group is the largest species group in *Macrophya*, with four species subgroup and forty-one species worldwide, all of which are all present in China (Li *et al.* 2018).

The *M. depressina* subgroup contains ten species with eight species from China: *M. coloritarsalina* Wei & Li, 2013 (China), *M. commixta* Wei & Nie, 2002 (China), *M. depressina* Wei, 2005 (China), *M. enslini* Forsius, 1925 (Japan), *M. huangi* Li & Wei, 2014 (China), *M. leyii* Chen & Wei, 2005 (China), *M. melanolabria* Wei, 1998 (China), *M. melanoclypea* Wei, 2002 (China), *M. rohweri* Forsius, 1925 (Japan), and *M. rubitibia* Wei & Chen, 2002 (China) (Chen *et al.* 2005; Chen & Wei 2002; Forsius 1925; Wei 2005; Wei & Chen 2002; Wei & Nie 1998b, 2002; Li *et al.* 2013, 2014a).

The *M. koreana* subgroup contains ten species with eight species from China: *M. cheni* Li, Liu & Wei, 2014 (China), *M. kongosana* Takeuchi (North Korea), *M. koreana* Takeuchi (Russia, North Korea, China), *M. fulvostigmata* Wei & Chen (China), *M. minutiluna* Wei & Chen (China), *M. zhongi* Wei & Chen (China), *M. dabieshanica* Wei & Xu (China), *M. liui* Wei & Li (China), and *M. yichangensis* Li, Liu & Wei, 2014 (China) (Li *et al.* 2014b; Takeuchi 1937; Wei & Chen 2002; Wei *et al.* 2013). Two species are reported as new to science here: *M. pseudominutiluna* Liu, Li & Wei **sp. nov.** from Hubei and *M. zhangae* Liu, Li & Wei **sp. nov.** from Shaanxi, China.

Seventeen species of the *M. sanguinolenta* subgroup are known with sixteen species from China: *M. canescens* Mallach (China), *M. elegansoma* Li, Liu & Wei, 2014 (China), *M. erythrocephalica* Wei & Nie (China), *M. erythrocnema* A. Costa (Europe, Turkey, Caucasia, China), *M. jiangi* Zhao & Wei (China), *M. leucotarsalina* Wei & Chen (China), *M. longipetiolata* Wei & Zhong (China), *M. maculotarsalina* Wei & Liu (China), *M. melanosomata* Wei & Xin (China), *M. pentanalia* Wei & Chen (China), *M. recognata* Zombori, 1979 (Europe), *M. reni* Li, Liu & Wei, 2014 (China), *M. rufoclypeata* Wei (China), *M. sanguinolenta* Gmelin (Europe, Turkey, Mongolia, Japan, North Korea, China), *M. shennongjiana* Wei & Zhao (China), and *M. yangi* Wei & Zhu (China) (Gmelin 1790; Costa 1859; Mallach 1936; Wei & Nie 1998a; Wei *et al.* 2003; Liu & Wei 2005; Zhao & Wei 2011; Zhu *et al.* 2012; Wu *et al.* 2012; Li *et al.* 2013, 2014b; Zombori 1979). Here, one species is described as new to science: *M. pseudopentanalia* Liu, Li & Wei **sp. nov.** from Shaanxi, China.

The *M. tongi* subgroup contains ten species, eight of which are from China: *M. femorata* Marlatt, 1898 (China; Japan), *M. forsiusi* Takeuchi, 1937 (Japan), *M. incrasitarsalia* Wei & Wu, 2012 (China), *M. leucotrochanterata* Wei & Li, 2012 (China), *M. linyangi* Wei, 2005 (China), *M. mikagei* Togashi, 2005 (Japan), *M. opacifrontalis* Li, Lei & Wei, 2014 (China), *M. pseudofemorata* Li, Wang & Wei, 2014 (China), *M. tongi* Wei & Ma, 1997 (China), and *M. vacillans* Malaise, 1931 (China, East Siberia, North Korea) (Li *et al.* 2014a; Malaise 1931; Marlatt 1898; Takeuchi 1937; Togashi 2005; Wei 2005; Wei & Lin 2005; Wei & Ma 1997; Wu *et al.* 2012). We report a new species, *M. qiliwei* Liu, Li & Wei **sp. nov.** from Shaanxi Province, China.

The species of the *Macrophya sanguinolenta* group are all similar in general morphology and constitute a clearly defined species group within *Macrophya*. In this study,

four new species belonging to this species group are described from China: *Macrophya pseudominutituna* Liu, Li & Wei **sp. nov.**, *M. pseudopentanalina* Liu, Li & Wei **sp. nov.**, *M. qiliwei* Liu, Li & Wei **sp. nov.** and *M. zhangae* Liu, Li & Wei **sp. nov.** According to available data, species in this group are distributed in mainland China. A key to all species found in China is provided.

## Material and methods

All specimens of these newly described species were obtained by sweeping in wooded bog and forest fringe zones in Hubei, Shaanxi and Zhejiang from 2014 to 2018. Six specimens of four new species were examined and studied for this work. The specimens were examined with a Motic-SMZ-171 stereomicroscope. Images of the imagines were taken with a Nikon D700 digital camera and a Leica Z16APO. The genitalia were examined with a Motic BA410E microscope, and photographed with Motic Moticam Pro 285A. Images were focus-stacked using Helicon Focus (HeliconSoft, Kharkiv, Ukraine) and further processed with Adobe Photoshop CS 11.0.

The terminology of genitalia follows Ross (1945) and that of general morphology follows Viitasaari (2002). For a few terms (e.g. middle fovea and lateral fovea), we follow Takeuchi (1952).

The terminology of genitalia follows Ross (1945) and that of general morphology follows Viitasaari (2002). For a few terms (e. g. middle fovea and lateral fovea), we follow Takeuchi (1952).

The holotypes and all paratype specimens are deposited in the Asian Sawfly Collection, Nanchang, China (ASMN).

Abbreviations used in the text and illustrations are as follows: OCL — the distance between a lateral ocellus and the occipital carina, or the hind margin of the head where this carina would be if it was developed (Benson 1954); OOL — the distance between an eye and a lateral ocellus; POL — the distance between the mesal margins of the 2 lateral ocelli.

## Taxonomy

### *Macrophya sanguinolenta* species group

Diagnosis. Body slender and mainly black, without metallic tinge; white maculae to varying extents on pronotum and mesoscutellum, hind trochanter and dorsal surface of hind tibia subapically; hind femur and tibia with reddish maculae more or less; fore wing without smoky macula below pterostigma usually; clypeus at its greatest breadth broader than the shortest distance between lower inner orbits of eyes; lateral margins convergent anteriorly, anterior margin incised to approximately  $1/5 \times - 1/2 \times$  length of clypeus, apex of lateral lobe obtuse or acute; malar space narrower than diameter of an ocellus; postocellar area broader than long; vertex with minute and dense punctures, interspaces between punctures narrow usually; antenna slender and black usually (if antennae partly black, several segments with white maculae or basal segments with reddish maculae), antennomere 3 clearly longer than antennomere 4; posterior margin of metepimeron without appendage; inner spur of hind leg

slightly longer than half length of metabasitarsus, metabasitarsus always slender, slightly longer than following four tarsomeres together, not dilated and compressed usually (except for *M. incrassitarsalia* Wei & Wu, 2012); claw with inner tooth slightly shorter than outer tooth; abdominal tergum 1 not reticulate; penis valve oval, narrowed towards apex, ergot short.

Remarks. The *Macrophya sanguinolenta* group is morphologically very easily differentiated from other species groups in the genus *Macrophya*, with a diagnosis provided by Li *et al.* (2018). The diagnoses to the *M. depressina* subgroup and the *M. tongi* subgroup have been provided by Li *et al.* (2014a, 2018) and to the *M. koreana* subgroup and the *M. sanguinolenta* subgroup have been provided by Li *et al.* (2014b, 2018). In China, the *M. sanguinolenta* group includes four new species from Hubei and Shaanxi, China. They can be separated using the following key.

### Key to the Chinese species of the *Macrophya sanguinolenta* group

1. Antennae not entirely black, with white rings at middle. (*M. depressina* subgroup) ..... 2
- Antennae entirely black, if antennae partly black, basal parts with reddish-brown maculae ..... 9
2. Antennomeres 6–7 with white maculae ..... 3
- Antennomeres 3–5 with white maculae ..... 4
3. Clypeus entirely yellowish white; middle serrulae of female lancet each with 1 proximal and 11–12 distal teeth. China (Gansu, Shaanxi, Hebei, Henan, Hubei) ..... *M. melanolabria* Wei
- Clypeus largely black, middle part with transverse and white macula; middle serrulae of female lancet each with 1 proximal and 14–15 distal teeth. China (Shanxi, Henan) ..... *M. melanoclypea* Wei
4. Antennomeres distinctly dilated near middle; middle of abdominal terga without line of white maculae, lateral sides of abdominal terga 1–7 with distinct white maculae, white maculae smaller toward back; hind tibia and tarsus entirely reddish; subbasal teeth of the middle serrulae large. China (Hubei, Guizhou) ..... *M. commixta* Wei & Nie
- Antennomeres dilated slightly near middle; middle of abdominal terga with distinct line of white maculae; hind tibia and tarsus not entirely black, dorsal sides with distinct white maculae; subbasal teeth of the middle serrulae small ..... 5
5. Hind femur and tibia with distinct, large reddish maculae ..... 6
- Hind femur and tibia without reddish maculae; or with some reddish maculae, but short ..... 7
6. Clypeus entirely black (some specimens with feeble, white maculae at center); face and frontal area below the top of the eyes in lateral view; lateral sides of abdominal tergum 1 without white macula. China (Gansu, Shanxi, Tianjin, Henan, Hubei, Zhejiang) ..... *M. rubitibia* Wei & Chen
- Clypeus largely white, but basally with black maculae; face and frontal area as high as the top of the eyes in lateral view; lateral sides of abdominal tergum 1 with small, white maculae. China (Sichuan) ..... *M. leyii* Chen & Wei
7. Abdominal tergum 1 without lateral white macula; middle of abdominal terga with distinct line of white maculae; posterior margin of pronotum with narrow maculae, not clear; prescutum entirely black. China (Hubei, Hunan) ..... *M. huangi* Li & Wei
- Abdominal tergum 1 with distinct, lateral white maculae; middle of abdominal terga without distinct line of white maculae; lateral corner of pronotum with clear, white maculae; prescutum with two narrow and long white maculae ..... 8
8. Basal 2/5 of hind femur yellowish white, middle 2/5 reddish brown, apical 1/5 black; hind tibia black with a long subapical white stripe dorsally and with an obscure reddish tinge; hind tarsus black, apical half of basitarsus and dorsum of tarsomeres 2–4 white; petiole of anal cell in the fore wing 1.8× as long

- as vein 1r-m, approximately 0.9× as long as vein cu-a; antenna entirely black in male. China (Jiangxi, Hunan, Fujian, Guizhou)..... *M. depressina* Wei
- Basal half of hind femur yellowish white, apical half black, and ventral side with yellowish white band; apical half of hind tibia yellowish brown and basal half orange; hind tarsus yellow brown without black macula; petiole of anal cell in the fore wing twice as long as vein 1r-m, approximately 1.2× as long as vein cu-a; middle antennomeres yellowish white in male. China (Hunan) ... *M. coloritarsalina* Wei & Li
9. Hind femur and tibia each with reddish brown maculae. (*M. sanguinolenta* subgroup)..... 10
- Hind femur or tibia with reddish brown maculae..... 26
10. Head and thorax in female largely with reddish brown and white maculae, shortly black; body in male largely with black maculae, short parts reddish and white ..... 11
- Body in both sexes largely black, short parts with some reddish and white maculae..... 13
11. Antennae clearly reduced, antennomeres 1–3 reddish brown; lateral lobes of clypeus obtuse and short; mesoscutellum and hind tarsus entirely reddish brown; inner side of hind femur with distinct, black maculae; stigma yellowish brown. (Antennae and mesoscutellum in male entirely black; hind tarsus entirely black; stigma blackish brown). China (Hunan, Guangxi, Fujian) ..... *M. erythrocephalica* Wei & Nie
- Antennae weakly reduced, antennomeres 1–2 reddish brown; lateral lobes of clypeus narrow and long; mesoscutellum entirely white; inner side shortly of hind femur with some black maculae; hind tarsus largely white; stigma reddish brown to blackish brown ..... 12
12. Dorsal frons and nearby area of ocellus with large, black maculae; anepimeron and metapleuron entirely black; mesonotum with narrow, V-like and reddish brown maculae; middle serrulae of lancet each with 1 proximal tooth and 6–7 distal teeth. China (Shanxi, Henan)..... *M. rufoclypeata* Wei
- Dorsal frons and near area of ocellus with small, black maculae; anepimeron largely and metapleuron largely reddish brown, shortly black; mesonotum with large, V-like and reddish brown maculae; middle serrulae of lancet each with 1 proximal tooth and 4–6 distal teeth. (Antennae and thorax in male entirely black). China (Gansu, Ningxia, Henan)..... *M. leucotarsalina* Wei Chen
13. Labrum and basal half of clypeus reddish brown; dorsal side of head and thorax with coarse and dense punctures, interspaces between the punctures not smooth; mesoscutellum entirely black. China (Hubei) · ..... *M. jiangi* Wei & Zhao
- Labrum and clypeus without reddish brown macula absolutely, other characteristics not differing from the former ..... 14
14. Dorsal side of hind tibia more or less with white maculae..... 15
- Dorsal side of hind tibia without white macula absolutely ..... 18
15. Posterior corners of pronotum with clear, white maculae; mesoscutellum entirely white..... 16
- Posterior margin of pronotum with narrow, white maculae, or without white macula absolutely; center of mesoscutellum white or mesoscutellum entirely black ..... 17
16. Labrum entirely and clypeus largely black, short parts white; clypeus half round, incised to 1/2 length of clypeus, lateral lobes narrow and long; 2 small, narrow maculae on posterior margin of postocellar area, not U-like; anterior corners of pronotum entirely black; terga 6–9 entirely black, other terga with distinct white maculae; subapical 1/2 of hind tibia with a long, white macula on dorsal side; middle serrulae of lancet each with 2 distal teeth, subbasal tooth large. China (Ningxia) ..... *M. reni* Li, Liu & Wei
- Labrum and clypeus almost entirely white, but basal margin of clypeus black; anterior margin sub-arched and incised to 1/3 length of clypeus, lateral corners slightly broad and short; a U-like white macula on posterior margin of postocellar area; anterior corners of pronotum with distinct, white maculae; all terga with distinct, white maculae; apex of hind tibia with a small white macula on dorsal side, distinctly shorter than 1/2 length of hind tibia; middle serrulae of lancet each with 15–16 distal

- teeth, subbasal tooth minute. China (Hubei)..... *M. shennongjiana* Wei & Zhao
17. Pronotum entirely black; mesoscutellum not entirely black, center with white maculae; hind tarsus largely white; lateral corners of terga 2–4 with distinct, white maculae, white maculae on lateral tergum 2 largest. (Mesoscutellum in male entirely black). China (Shandong) ..... *M. maculotarsalina* Wei & Liu
- . Posterior margin of pronotum with narrow, white bands; mesoscutellum and hind tarsus entirely black; lateral corners of terga 2–3 with distinct, white maculae, white maculae on lateral tergum 2 equal to lateral tergum 3 nearly. (Labrum and apical 2/3 of clypeus in male white). China (Gansu, Shaanxi)..... *M. yangi* Wei & Zhu
18. Serrulae of lancet clearly elevated, mastoid process like; lateral corners of terga 2–3 with clear, white maculae, white macula on lateral tergum 2 largest ..... 19
- . Serrulae of lancet not mastoid process like ..... 20
19. Postocellar area entirely black; abdominal tergum 4 entirely black; subapex of hind tibia reddish brown dorsally; hind trochanter largely black, partly white. China (Gansu, Shaanxi, Shanxi, Beijing, Tianjin, Hebei, Henan) ..... *M. pentanalia* Wei & Chen
- . Posterior margin of postocellar area white; two lateral sides of abdominal tergum 4 with distinct white maculae; subapex of hind tibia with a small macula dorsally; hind trochanter entirely white. China (Hubei)..... *M. pseudopentanalia* Liu, Li & Wei **sp. nov.**
20. Hind trochanter reddish brown. China (Hebei)..... *M. canescens* Mallach
- . Hind trochanter black or white ..... 21
21. Outer side of hind coxa entirely black ..... 22
- . Outer side of hind coxa with an oval, white macula basally ..... 23
22. Without petiole of anal cell in fore wing, but with across vein; labrum largely black, margins with small, triangular and pale brown maculae; clypeus entirely black; dorsal head with sparse and shallow punctures, smooth interspaces clear. Europe; Caucasias; China (Hebei) ..... *M. erythrocnema* A. Costa
- . Petiole of anal cell in fore wing and long punctiform; labrum largely white, margins with brown and narrow maculae; clypeus not entirely black, lateral corners with obtuse and pale maculae; dorsal head with dense and coarse punctures, interspaces between punctures narrow. Europe.. *M. recognata* Zombori
23. Lateral corners of terga 3–5 with small, white maculae ..... 24
- . All terga entirely black, lateral corners without white macula ..... 25
24. Posterior corners of pronotum with clear, white macula; posterior margin of tergum 1 with broad, white bands. China (Sichuan)..... *M. elegansoma* Li, Liu & Wei
- . Pronotum entirely black; posterior margin of tergum 1 with very narrow, white band. Europe; Turkey; Mongolia; Korea (Tonai); Japan (Honshu); China (Heilongjiang, Jilin, Inner Mongolia, Shanxi) ..... *M. sanguinolenta* (Gmelin)
25. Dorsal view of head with few minute, very sparse and shallow punctures, interspaces between punctures distinctly broader than diameter of punctures; postocellar area 2× as broad as long, lateral furrow deep; hind trochanter entirely white; hind tibia and metabisitarsus largely reddish brown, narrow base and apex of hind tibia black; hind tarsus largely white; petiole of anal cell in fore wing 1.8× as long as vein 1r-m. China (Jilin, Hebei, Henan, Hubei, Chongqing)..... *M. longipetiolata* Wei & Zhong
- . Dorsal view of head with distinct punctures, interspaces between punctures narrower than diameter of punctures; postocellar area 1.8× as broad as long, lateral furrow very shallow and obscure; hind trochanter largely black, dorsal side with a white stripe; hind tibia reddish brown at center, base and apex black; hind tarsus entirely black; petiole of anal cell in fore wing as long as vein 1r-m. China (Gansu, Shanxi, Beijing) ..... *M. melanosomata* Wei & Xin
26. Hind femur with reddish brown maculae largely; hind tibia entirely black, if hind tibia not entirely black, dorsal sides with distinct white maculae (*M. tongi* subgroup) ..... 27

- Hind femur entirely black; hind tibia with reddish brown maculae more or less (*M. koreana* subgroup) 35
- 27. Hind tibia entirely black, dorsal side without white macula ..... 28
- Hind tibia largely black, dorsal side with distinct white macula subapically ..... 30
- 28. Metabasitarsus distinctly dilated, compressed; dorsal head and thorax with dense and coarse punctures, without smooth interspaces; mesoscutellum entirely and all trochanters largely black; apex of mesopleuron clearly elevated, with blunt hip; fore wing with cell 2Rs clearly longer than cell 1Rs; serrulae of lancet flat, subbasal tooth minute, middle serrulae each with 1 proximal and 10–11 distal teeth. China (Gansu, Shaanxi, Hebei, Hubei) ..... *M. incrassitarsalia* Wei & Wu
- Metabasitarsus slender, not dilated or compressed ..... 29
- 29. Dorsal frontal area sparsely and shallowly punctured, interspaces between punctures obvious, mesoscutellum roundly elevated, without protuberance, as high as the top of the mesonotum; posterior of the lateral sides of tergum 1 with small, white macula, not connected toward the middle; sheath slightly shorter than the metabasitarsus, distinctly extended to the apex of the abdomen, setae on sheath slightly curved in dorsal view; lancet slightly long, serrulae clearly protruded, subbasal tooth clear. Japan (Honshu, Shikoku, Kyushu); China (Shandong) ..... *M. femorata* Marlatt
- Dorsal frontal area densely and coarsely punctured, without interspaces between punctures; mesoscutellum distinctly elevated, with tapered protuberance, higher than the top of the mesonotum; posterolateral tergum 1 with distinct, white maculae, connected and narrower toward the middle; sheath distinctly shorter than the metabasitarsus, not extended to the apex of the abdomen; lancet short, serrulae flat, subbasal tooth very fine. China (Hubei) ..... *M. pseudofemorata* Li, Wang & Wei
- 30. All trochanters of female and male entirely white; frontal area smooth, without distinct punctures; the mesoscutellum and dorsal side of hind tarsus of female with clear, white maculae, lateral terga 2–5 with large, square, and white maculae; mesoscutellum and hind tarsus of male entirely black, posterolateral terga 2–6 with small, white maculae. China (Ningxia, Gansu, Shanxi, Hebei) ..... *M. leucotrochanterata* Wei & Li
- Fore and middle trochanters in female and male entirely or partly black, hind trochanter entirely white ..... 31
- 31. Clypeus entirely white; labrum largely white, basally with black maculae ..... 32
- Clypeus largely black, ventrally with fine, white maculae; labrum entirely black ..... 33
- 32. Hind femur of female and male largely reddish brown, basally with black and narrow ring, apically with black maculae; fore and middle trochanters of male largely white, dorsally with small, black maculae. China (Shaanxi, Anhui, Zhejiang, Hunan, Jiangxi, Guangxi) ..... *M. tongi* Wei & Ma
- Hind femur of female largely dark reddish brown, basally with white maculae, apically with black maculae; male unknown. China (Guizhou) ..... *M. linyangi* Wei
- 33. Middle serrulae of lancet protruding clearly. China (Zhejiang, Jiangsu, Hunan, Jiangxi, Guizhou) ..... *M. opacifrontalis* Li, Lei & Wei
- Middle serrulae of lancet flat nearly ..... 34
- 34. Postocellar area 2.5× broader than long; mesoscutellum entirely white; abdominal terga 3–6 with large white maculae laterally; subapex in dorsal side of hind tibia with a large white macula, approximately 0.4× length of hind tibia. Korea (Mosanrei); East Siberia; China (Heilongjiang, Jilin, Liaoning, Gansu, Ningxia, Shaanxi, Shanxi, Henan) ..... *M. vacillans* Malaise
- Postocellar area 2× broader than long; mesoscutellum entirely black; abdominal terga 2–3 with a small white maculae laterally; subapex in dorsal side of hind tibia with a small white macula. China (Shaanxi) ..... *M. qiliwei* Liu, Li & Wei **sp. nov.**
- 35. Dorsal front with dense punctures, interspaces between punctures narrow; posterolateral tergum 1 with broad white macula, tergum 2 entirely black; or lateral tergum 2 with small maculae; costal vein in fore

- wing and stigma black brown ..... 36
- . Dorsal front with sparse punctures, interspaces between punctures broad; tergum 1 entirely black, posterolateral tergum without white macula; lateral tergum 2 with large white macula; or costal vein in fore wing and stigma yellowish brown ..... 42
36. Below stigma in fore wing without smoky, transverse band ..... 37
- . Below stigma in fore wing with smoky, transverse bands ..... 39
37. Pronotum and terga 2–10 entirely black; antennomere 3 longer than apical antennomeres 7–9 combined; apical sheath longer than basal sheath; dorsal side of head with smooth interspaces between punctures, without microsculpture; anal cell in fore wing with a short and erect cross vein; anterior margin shallowly incised to  $1/3 \times$  length of clypeus; hind coxa with a white macula on outer side  $1/2 \times$  length of coxa; all known males with hind tibia and tarsi black, without reddish macula ..... 38
- . Posterior margin of pronotum with narrow, white maculae; lateral terga 2–5 with distinct white maculae, terga 6–10 entirely black; antennomere 3 as long as apical antennomeres 7–9 combined; apical sheath slightly shorter than basal sheath; dorsal side of head without smooth interspaces between punctures, but with distinct microsculptures; petiole of anal cell in fore wing slightly longer than vein 1r-m; anterior margin shallowly incised to  $2/5$  length of clypeus; hind coxa with a white macula on outer side  $3/5$  times length of coxa; all known males with most of hind tibia and tarsus with reddish maculae, rest with black maculae or white maculae. China (Shaanxi, Hubei) ..... *M. yichangensis* Li, Liu & Wei
38. Subapical antennomeres distinctly inflated, antennomere 6 about  $1.2 \times$  longer than broad; ovipositor sheath distinctly shorter than fore femur (6 : 7), apical sheath slightly longer than basal sheath (8 : 7); middle serrulae with 4–6 distal teeth. China (Henan, Hubei) ..... *M. liui* Wei & Li
- . Subapical antennomeres weakly inflated, antennomere 6 not less than  $2 \times$  longer than broad; ovipositor sheath as long as fore femur, apical sheath distinctly longer than basal sheath (11 : 7); middle serrulae with 8–10 distal teeth. Korea (Mosanrei, Tonai, Hokugan, Fusenko); Russia; China (Inner Mongolia, Gansu, Shaanxi, Beijing, Shanxi, Henan) ..... *M. koreana* Takeuchi
39. Clypeus entirely black ..... 40
- . Basal half of clypeus black, apical half white ..... 41
40. Middle fovea shallow, long dot-like, lateral foveae not deep; postocellar area  $2.2 \times$  broader than long; dorsal side of hind tibia without white macula subapically; setae on sheath curved in dorsal view; middle serrulae of lancet with 7–10 distal teeth, subbasal tooth small. China (Hubei, Guizhou) ..... *M. cheni* Li, Liu & Wei
- . Middle fovea distinct, broad dot-like; lateral foveae deep; postocellar area  $2 \times$  broader than long; dorsal side of hind tibia with a small white macula subapically; setae on sheath almost not curved in dorsal view; middle serrulae of lancet with 5–6 distal teeth, subbasal tooth slightly large. China (Shaanxi, Henan, Hubei) ..... *M. minutiluna* Wei & Chen
41. Postocellar area  $2.4 \times$  broader than long; fore wing with cross-vein 2r joining cell 2Rs at apical  $1/5$ , petiole of anal cell in hind wing  $0.25 \times$  length of cross-vein cu-a; lateral corners of abdominal tergum 5 with distinct white maculae; middle serrulae of lancet each with 1 proximal and 4–7 distal teeth, subbasal tooth slightly large. China (Shaanxi) ..... *M. pseudominutiluna* Liu, Li & Wei **sp. nov.**
- . Postocellar area  $2 \times$  broader than long; fore wing with cross-vein 2r joining cell 2Rs at apical  $1/3$ , petiole of anal cell in hind wing  $2/3 \times$  length of cross-vein cu-a; abdominal tergum 5 entirely black, lateral corners without white macula; middle serrulae of lancet each with 1 proximal and 10–12 distal teeth, subbasal tooth small. China (Shaanxi) ..... *M. zhangae* Liu, Li & Wei **sp. nov.**
42. Hind tibia with long, white macula; hind trochanter black; metabasitarsus reddish brown, short parts with white maculae; clypeus and labrum white, with black maculae at times; mesoscutellum white; serrulae flat. Korea (Mosanrei); Siberia ..... *M. kongosana* Takeuchi



- Hind tibia without white macula; most of hind trochanter partly or entirely white; metabasitarsus reddish brown or black brown, without white macula..... 43
- 43. Clypeus white; all trochanters and basal 1/3 of hind femur with yellowish white maculae; costal vein in fore wing and stigma yellowish brown; tergum 2 entirely black; mesoscutellum entirely black; subapical antennomeres 5–8 inflated strongly; most of mesepisternum with small punctures. China (Shaanxi, Hebei, Henan) ..... *M. fulvostigmata* Wei & Chen
- Clypeus black; fore and middle trochanters and hind femur entirely black; costal vein in fore wing and stigma black brown; tergum 2 not entirely black, lateral tergum with distinct, white maculae; mesoscutellum largely white; most of mesepisternum with large punctures..... 44
- 44. Subapical antennomeres 5–8 strongly compressed and inflated, antennomere 7 less than 2× longer than broad; anterior margin half roundish and incised to 1/2 length of clypeus; petiole of anal cell in fore wing longer than vein r+m; hind tarsi with reddish brown maculae in both sexes; valviceps of penis valve trapezoid, annular spine bands join each other in the middle part. China (Gansu, Shaanxi, Hebei, Henan) ..... *M. zhongi* Wei & Chen
- Subapical antennomeres 5–8 weakly inflated, hardly compressed, antennomere 7 approximately 2.5× longer than broad; anterior margin circular arched and incised to 1/3 length of clypeus, lateral lobes obtuse, triangular; petiole of anal cell in fore wing shorter than vein r+m; hind tarsus black brown in male; valviceps of penis valve approximate to oblique rectangle, dorsal margin arched, annular spine bands separated from each other in the middle part. China (Anhui, Zhejiang) .....  
..... *M. dabieshanica* Wei & Xu

1. ***Macrophya pseudominutiluna* Liu, Li & Wei sp. nov.** (Figs 1–10)

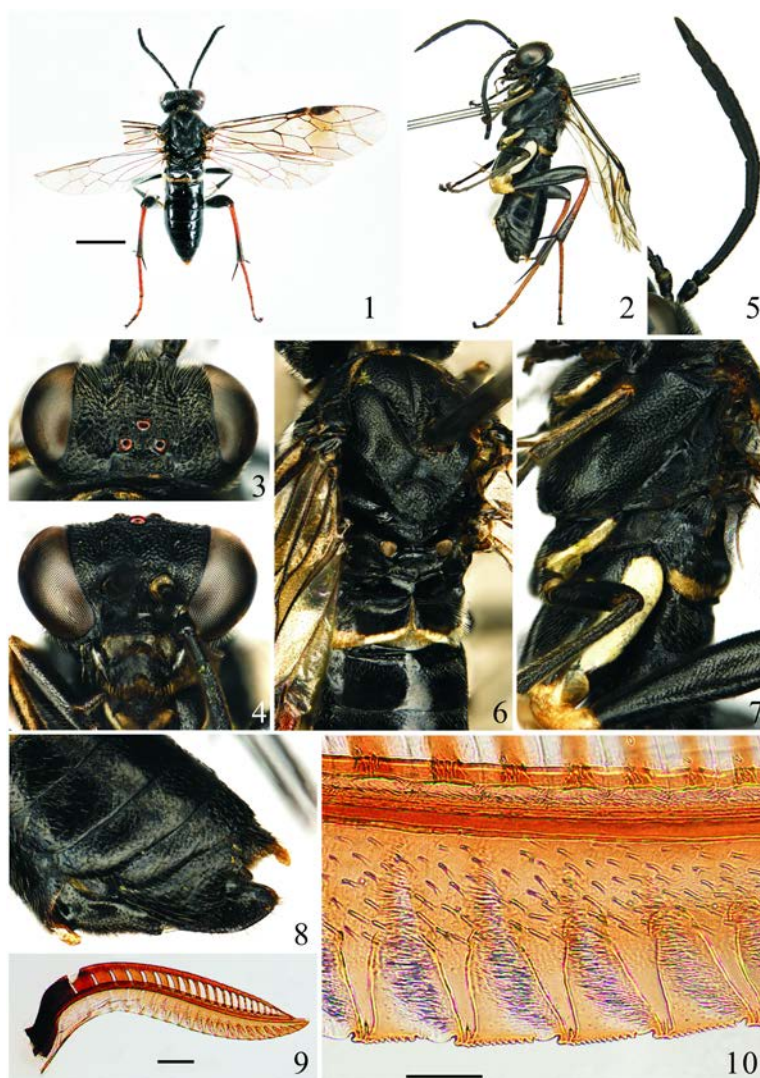
<http://zoobank.org/297577D7-898F-47FE-A74E-6C3E15797DD6>

Description. Holotype, female (Figs 1–10). Body length 9 mm (Figs 1, 2).

Color. Body largely black; a small triangular macula at apex of labrum and palp largely pale blackish brown; following parts white: basal half of mandibles, apical half of clypeus (anterior margin black), posterior margin of postocellar area, posterior margin of pronotum, stripes in outer side of fore and middle coxae, a small macula apically in anterior side of fore and middle femora, stripes on anterior side of fore and middle tibiae, an oval macula in outer side of hind coxa, hind trochanter entirely, parts in dorsal side subapically of hind tarsomere 1, parts at dorsal side of hind tarsomeres 2–3, posterior 1/3 of abdominal tergum 1, small maculae laterally of abdominal terga 3–4; basal 2/3 of hind tibia, hind tarsomere 1 and tarsomeres 2–4 largely, reddish brown. Body hairs silver. Wings hyaline, below stigma with pale smoky macula but as broad as stigma and borderline fuzzy, stigma and veins largely black (Figs 1, 2).

Punctuation. Dorsal side of head not shiny, with coarse and dense punctures, without smooth interspace (Fig. 3); labrum and clypeus less shiny, with large and shallow punctures sparsely, microsculptures weak (Fig. 4). Thorax not shiny, punctures on pronotum and mesonotum with minute and dense punctures, without smooth interspace, but with weak microsculptures; mesoscutellum with some large punctures and weak microsculptures; mesoscutellar appendage with coarse punctures and clear microsculptures (Fig. 6); mesepisternum with dense punctures, interspaces between punctures with fine microsculptures, upper half with large punctures, lower half with minute punctures; anepimeron not shiny, with coarse and clear wrinkles; anterior area of katapimeron strongly shiny, without puncture or microsculpture, other area with some large punctures and clear microsculptures, dorsal margin with some coarse punctures; metepisternum not shiny, with

minute punctures; metepimeron less shiny, with clear punctures and microsculptures (Fig. 7). Lateral areas of abdominal tergum 1 with some shallow punctures and fine microsculptures, less shiny; basal 1/3 of abdominal terga 2–3 with punctures, apical 2/3 with very sparse punctures; bases of abdominal terga 4–8 with weak punctures, apical parts without punctures. Hind coxa and outer side of hind femur with minute punctures densely, microsculptures fine. Ovipositor sheath coriaceous, apical margin with weak punctures and fine microsculptures.



Figures 1–10. *Macrophya pseudomilutiluna* sp. nov., ♀, holotype. 1. Adult, dorsal view; 2. Adult, lateral view; 3. Head, dorsal view; 4. Head, frontal view; 5. Antenna, lateral view; 6. Thorax, dorsal view; 7. Thorax, lateral view; 8. Ovipositor sheath, lateral view; 9. Lancet; 10. 7th–10th serrulae. Scale bars = 2 mm (Fig.1); 200 µm (Fig. 9); 50 µm (Fig. 10).

Labrum weakly elevated, sub-square, apical margin truncate; clypeus elevated, base distinctly broader than distance between lower corner of eyes, anterior margin deeply arched,

approximately incised to 5/12 length of clypeus, lateral corners slightly narrowed and long, apical margin obtuse roundly (Fig. 4); malar space 0.5× as long as diameter of median ocellus; frontal field slightly flat, not depressed, as high as top of eyes in lateral view; median fovea long punctiform, lateral foveae deep, furrow-like; interocellar furrow and postocellar furrow weak; POL : OOL : OCL = 20 : 50 : 25; postocellar area slightly elevated, 2.4× broader than long (60 : 25), anterior half of lateral furrows shallow, posterior half of lateral furrows deep, divergent backwards; narrowed behind eyes in dorsal view, occipital carina complete (Fig. 3). Antenna slender, as long as combined head and thorax together (35 : 36), slightly shorter than abdomen (35 : 45); antennomere 2 broader than long, antennomere 3 shorter than combined antennomeres 4 and 5 together (82 : 104), subapical antennomeres dilated and weakly compressed, antennomeres 6–9 reduced, the ratio of antennomeres 3–9 as 82 : 54 : 50 : 35 : 32 : 27 : 30 (Fig. 5). Mesoscutellum roundly elevated, with lower peak and lateral carinae, as high as top of mesonotum in lateral view; mesoscutellar appendage with a cute median longitudinal carina; lower part of mesopleuron weakly elevated, dorsal-posterior platform of mesepimeron as broad as diameter of median ocellus; metepimeron without appendage, posterior corners obtuse roundly; distance between cenchri approximately 2.3× as long as breadth of a cenchrus; mesopleuron and metapleuron as shown in Fig. 7. Inner tibial spur of hind leg approximately 0.64× as long as metabasitarsus (32 : 50), metabasitarsus slender, longer than following 4 tarsomeres together (50 : 42); claw with inner tooth shorter than outer tooth. Fore wing with vein cu-a joining cell 1M at basal 1/3, vein 2r joining cell 2Rs at apical 1/3, anal cell with a petiole in fore wing, as long as vein 1r-m; anal cell with a petiole in hind wing 2/3 length of vein cu-a. Ovipositor sheath slightly longer than middle tibia (48 : 45), shorter than metabasitarsus (48 : 52), apical margin slightly acute roundly, valvula 3 slightly longer than valvifer 2 (55 : 52), ovipositor sheath in lateral view as shown in Fig. 8. Lancet with 19 serrulae (Fig. 9), serrulae slightly oblique, middle serrulae each with 1 proximal and 10–12 distal teeth, subbasal tooth small, annular spine bands not broad, spines sparse, 7th–10th at base as shown in Fig. 10.

Male. Unknown.

**Holotype.** ♀, **China**, Hubei, Mt. Shennongjia, Yazikou, N. 31°30.022', E. 110°20.044', alt. 1900 m, 28-VII-2015, ethyl acetate, leg. Wei XIAO (CSCS15127), ASMN.

**Etymology.** The new specific epithet “*pseudominutiluna*” is derived by adding the Greek “*pseudo-*” to “*minutiluna*” referring to this new species being similar to “*M. minutiluna* Wei & Chen, 2002”.

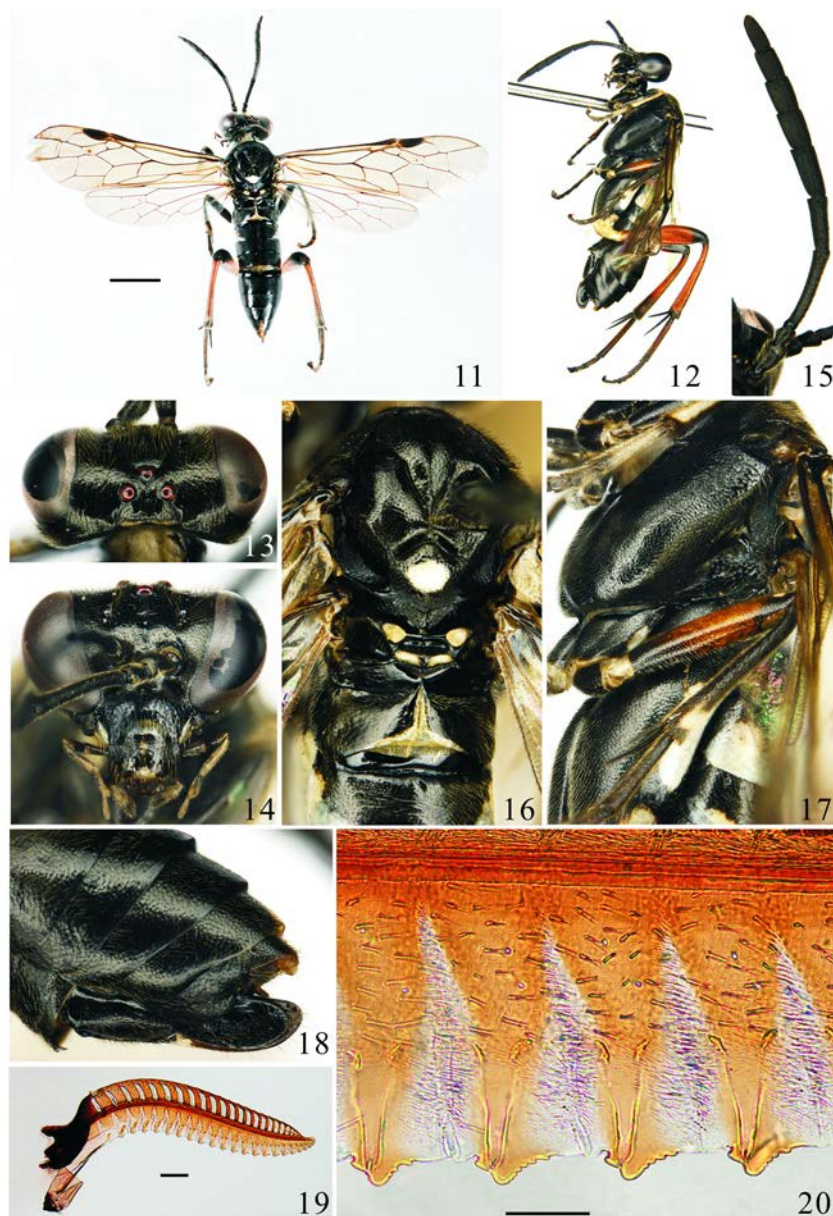
Host plants. Unknown.

**Remarks.** This new species is similar morphologically to *M. minutiluna* Wei & Chen, 2002 in having the basal half of labrum black, apical half white (anterior margin black); middle serrulae of lancet each with 1 proximal and 10–12 distal teeth, subbasal tooth small; apical 1/3 of hind tibia dark reddish brown to black, basal 2/3 of hind tibia reddish brown, subapex without white macula of hind tibia dorsally.

## 2. *Macrophya pseudopentanalina* Liu, Li & Wei sp. nov. (Figs 11–20)

<http://zoobank.org/7F49186F-D209-4987-B3BF-108CBDFAE053>

**Description.** Holotype, female (Figs. 11–20). Body length 9–10 mm (Figs. 11–12).



Figures 11–20. *Macrophya pseudopentanalía* sp. nov., ♀, holotype. 11. Adult, dorsal view; 12. Adult, lateral view; 13. Head, dorsal view; 14. Head, frontal view; 15. Antenna, lateral view; 16. Thorax, dorsal view; 17. Thorax, lateral view; 18. Ovipositor sheath, lateral view; 19. Lancet; 20. 7th–10th serrulae. Scale bars = 2 mm (Fig. 11); 200 µm (Fig. 19); 50 µm (Fig. 20).

**Color.** Body largely black; palp largely blackish brown; following parts white: basal half of mandibles, a small triangular macula at apex of labrum, two small long maculae in posterior margin of postocellar area, narrow band at posterior margin of pronotum, center part of mesoscutellum, cenchri, parts of metascutellum, median seam and posterior margin at center of abdominal tergum 1, two lateral sides with large triangular maculae on abdominal

tergum 2, two lateral sides with stripes of abdominal terga 3–4, center part of abdominal tergum 8 and abdominal tergum 10 largely. Fore and middle legs largely black; basal margins of fore and middle coxae, fore and middle trochanters shortly, anterior sides of fore femur and tibia, anterior side largely of fore tarsomeres, a small macula in anterior side of middle femur, a small macula in dorsal side of middle tibia and anterior side largely of middle tarsomeres, white; anterior side largely of middle tarsomere (except for apex and base with black maculae) reddish brown. Hind legs largely reddish brown; hind coxa black (except for apex white and outer side with an oval white macula), hind trochanter entirely white, base and apex of hind femur black (dorsal side subapically with a small weak white macula), hind tarsomeres largely dark reddish brown, hind tarsomeres 2–3 with white maculae in dorsal side. Body hairs silver, setae in ovipositor sheath blackish brown. Wings hyaline, without smoky macula, stigma and veins largely blackish brown (Figs 11, 12).

**Punctuation.** Dorsal side of head shiny, with minute and sparse punctures, interspaces between punctures with fine microsculptures (Fig. 13); labrum and clypeus less shiny, with large and shallow punctures sparsely, microsculptures weak (Fig. 14). Thorax not shiny, punctures on mesonotum with minute and dense punctures, interspaces between punctures with fine microsculptures; mesoscutellum less shiny, center with some large punctures and weak microsculptures; mesoscutellar appendage with coarse punctures and clear microsculptures; metascutellum with clear punctures and microsculptures (Fig. 16); mesepisternum with dense punctures, interspaces between punctures with fine microsculptures, upper half part with large punctures, lower half part with minute punctures; anepimeron not shiny, with coarse and clear wrinkles; anterior area of katepimeron strongly shiny, without punctures or microsculpture, other area with some large punctures and clear microsculptures, dorsal margin with some coarse punctures; metepisternum not shiny, with minute punctures; metepimeron less shiny, with clear punctures and microsculptures (Fig. 17). Lateral areas of abdominal tergum 1 with some shallow punctures and fine microsculptures, less shiny; basal 2/3 of abdominal terga 2–7 with punctures, apical 1/3 without punctures. Hind coxa and outer side of hind femur with minute punctures densely, microsculptures fine. Ovipositor sheath coriaceous, apical margin with weak punctures and fine microsculptures.

Labrum weakly elevated, sub-square, apical margin truncate; clypeus elevated, base distinctly broader than distance between lower corner of eyes, anterior margin deeply arched, approximately incised to 1/2 length of clypeus, lateral corners slightly narrowed and long, apical margin obtuse roundly (Fig. 14); malar space 0.25× as long as diameter of median ocellus; frontal field slightly flat, not depressed, as high as top of eyes in lateral view; median fovea long punctiform, lateral foveae deep, furrow-like; interocellar furrow and postocellar furrow weak; POL : OOL : OCL = 33 : 57 : 30; postocellar area slightly elevated, 2.6× broader than long (78 : 30), anterior 1/3 of lateral furrows shallow, posterior 2/3 of lateral furrows deep, divergent backwards; narrowed behind eyes in dorsal view, occipital carina complete (Fig. 13). Antenna slender, slightly longer than combined head and thorax together (52 : 48), shorter than abdomen (52 : 70); antennomere 2 broader than long, antennomere 3 shorter than combined antennomeres 4 and 5 together (120 : 145), subapical antennomeres dilated and weakly compressed, antennomeres 6–9 reduced, the ratio of antennomeres 3–9 as 82 : 52 : 46 : 36 : 33 : 28 : 38 (Fig. 15). Mesoscutellum weakly

elevated, without peak or lateral carina, slightly higher than top of mesonotum in lateral view; mesoscutellar appendage with a lower and short median longitudinal carina; lower part of mesopleuron weakly elevated, dorsal-posterior platform of mesepimeron as broad as diameter of median ocellus; metepimeron without appendage, posterior corners obtuse roundly; distance between cenchri approximately 2× as long as breadth of a cenchrus; mesopleuron and metapleuron as shown in Fig. 17. Inner tibial spur of hind leg approximately 0.63× as long as metabasitarsus (25 : 40), metabasitarsus slender, slightly longer than following 4 tarsomeres together (40 : 35); claw with inner tooth shorter than outer tooth. Fore wing with vein cu-a joining cell 1M at basal 1/4, vein 2r joining cell 2Rs at apical 1/3, anal cell with a petiole in fore wing, slightly shorter than vein cu-a; anal cell with a petiole in hind wing slightly shorter than vein cu-a. Ovipositor sheath slightly longer than metabasitarsus, apical margin slightly narrowed roundly, valvula 3 longer than valvifer 2 (105 : 95), ovipositor sheath in lateral view as shown in Fig. 18. Lancet with 21 serrulae (Fig. 19), serrulae slightly oblique, middle serrulae each with 1 proximal and 3–5 distal teeth, subbasal tooth slightly large, annular spine bands not broad, spines sparse, 7th–10th at base as shown in Fig. 20.

Male. Unknown.

**Holotype.** ♀, **China**, Shaanxi, Mei County, Mt. Taibai, N. 34°3'15", E. 107°53'40", alt. 1060 m, 31-V-2018, ethyl acetate, leg. Meicai WEI & Lin LIU (CSCS18038), ASMN.  
**Paratypes.** 2♀, **China**, Shaanxi, Mei County, Mt. Taibai, N. 34°3'15", E. 107°53'40", alt. 1060 m, 31-V-2018, ethyl acetate, leg. Xiufang LI, Shuxin Liu & Yiwen ZHANG (CSCS18039), ASMN.

Etymology. The new specific epithet “*pseudopentanalía*” is derived from the Greek “*pseudo-*” and with “*pentanalía*” referring to this new species being similar to “*M. pentanalía* Wei & Chen, 2002”.

Host plants. Unknown.

Remarks. This new species is morphologically similar to *M. pentanalía* Wei & Chen, 2002 in having the two small long maculae in posterior margin of postocellar area white; two lateral sides of abdominal tergum 4 with distinct white maculae; subapex of hind tibia with a small macula dorsally; hind trochanter entirely white.

### 3. *Macrophya qiliweii* Liu, Li & Wei sp. nov. (Figs 21–30)

<http://zoobank.org/3C41125F-10F4-4F1F-95C3-636406551D82>

Description. Holotype, female (Figs 21–30). Body length 8.5 mm (Figs 21, 22).

Color. Body largely black; palp largely, a small triangular macula at apex of labrum and dorsal parts largely of fore and middle tarsomeres pale blackish brown; following parts white: two small maculae in posterior margin of postocellar area, posterior margin of pronotum, cenchri, median seam and posterior margin at center of abdominal tergum 1, lateral corners with large maculae of abdominal terga 2–3, posterior margin at center of abdominal tergum 8, center of abdominal tergum 10, apical margins and stripes in outer side of fore and middle coxae, apical margin and outer side with an oval macula of hind coxa, fore and middle trochanters shortly, hind trochanter entirely, stripes in anterior sides of fore and middle femur, anterior side of fore tibia, a small macula subapically in anterior side of middle tibia and a long macula subapically in dorsal side of hind tibia. Body hairs silver,



setae in ovipositor sheath blackish brown. Wings hyaline, without smoky macula, stigma and veins largely blackish brown (Figs 21, 22).



Figures 21–30. *Macrophya qiliweii* sp. nov., ♀, holotype. 21. Adult, dorsal view; 22. Adult, lateral view; 23. Head, dorsal view; 24. Head, frontal view; 25. Antenna, lateral view; 26. Thorax, dorsal view; 27. Thorax, lateral view; 28. Ovipositor sheath, lateral view; 29. Lancet; 30. 6th–8th serrulae. Scale bars = 2 mm (Fig. 21); 200 µm (Fig. 29); 50 µm (Fig. 30).

**Punctuation.** Dorsal side of head less shiny, with minute and shallow punctures sparse,

interspaces between punctures with fine microsculptures (Fig. 23); labrum and clypeus less shiny, with large and shallow punctures sparse, microsculptures weak (Fig. 24). Thorax less shiny, punctures on mesonotum with minute and dense punctures, interspaces between punctures with fine microsculptures; mesoscutellum less shiny, center with some large punctures and weak microsculptures; mesoscutellar appendage with coarse punctures and clear microsculptures; metascutellum with clear punctures and microsculptures (Fig. 26); mesepisternum with dense punctures, interspaces between punctures with fine microsculptures, upper half with large punctures, lower half with minute punctures; anepimeron not shiny, with coarse and clear wrinkles; anterior area of katepimeron strongly shiny, without punctures or microsculpture, other areas with some large punctures and clear microsculptures, dorsal margin with some coarse punctures; metepisternum not shiny, with minute punctures; metepimeron less shiny, with clear punctures and microsculptures (Fig. 27). Lateral areas of abdominal tergum 1 with some shallow punctures and fine microsculptures, less shiny; basal 2/3 of abdominal terga 2–3 with punctures, apical 1/3 without punctures; basal half of abdominal terga 4–7 with weak punctures, apical half without punctures. Hind coxa and outer side of hind femur with minute punctures densely, microsculptures fine. Ovipositor sheath coriaceous, apical margin with weak punctures and fine microsculptures.

Labrum weakly elevated, sub-square, apical margin truncate; clypeus elevated, base distinctly broader than distance between lower corner of eyes, anterior margin deeply arched, approximately incised to 1/2 length of clypeus, lateral corners slightly narrowed and long, apical margin obtuse roundly (Fig. 24); malar space 0.25× as long as diameter of median ocellus; frontal field slightly flat, not depressed, as high as top of eyes in lateral view; median fovea long punctiform, lateral foveae deep, furrow-like; interocellar furrow and postocellar furrow weak; POL : OOL : OCL = 20 : 42 : 20; postocellar area slightly elevated, 2× broader than long (50 : 25), anterior 1/3 of lateral furrows shallow, posterior 2/3 of lateral furrows deep, divergent backwards; narrowed behind eyes in dorsal view, occipital carina complete (Fig. 23). Antenna slender, as long as combined head and thorax together, slightly shorter than abdomen (56 : 66); antennomere 2 broader than long, antennomere 3 shorter than combined antennomeres 4 and 5 together (84 : 93), subapical antennomeres dilated and weakly compressed, antennomeres 6–9 reduced, the ratio of antennomeres 3–9 as 84 : 50 : 43 : 35 : 30 : 28 : 38 (Fig. 25). Mesoscutellum weakly elevated, without peak or lateral carina, slightly lower than top of mesonotum in lateral view; mesoscutellar appendage with a lower and short median longitudinal carina; lower part of mesopleuron weakly elevated, dorsal-posterior platform of mesepimeron as broad as diameter of median ocellus; metepimeron without appendage, posterior corners obtuse roundly; distance between cenchri approximately 2× as long as breadth of a cenchrus; mesopleuron and metapleuron as shown in Fig. 27. Inner tibial spur of hind leg approximately 0.67× as long as metabasitarsus (37 : 56), metabasitarsus slender, as long as following 4 tarsomeres together; claw with inner tooth shorter than outer tooth. Fore wing with vein cu-a joining cell 1M at basal 1/4, vein 2r joining cell 2Rs at apical 1/4, anal cell with a petiole in fore wing, shorter than vein cu-a; anal cell with a petiole in hind wing 2/3 length of vein cu-a. Ovipositor sheath shorter than metabasitarsus (36 : 40), apical margin slightly acute roundly, valvula 3 slightly shorter than valvifer 2 (85 : 95), ovipositor sheath in lateral view as shown in Fig. 28. Lancet with 19 serrulae (Fig. 29), serrulae slightly oblique, middle serrulae each with 1 proximal and 5



distal teeth, subbasal tooth slightly large, annular spine bands not broad, spines sparse, 6th–8th at base as shown in Fig. 30.

Male. Unknown.

**Holotype.** ♀, **China**, Shaanxi, Liuba County, Sangyuan, Fantiaoyu, N. 33°42.733', E. 107°12.733', alt. 1303 m, 14-VI-2014, ethyl acetate, leg. Liwei QI & Weinan KANG (CSCS14111), ASMN.

**Etymology.** The new specific epithet “*qiliwei*” is derived from the name of Mr. Liwei QI for collecting the holotype of this new species.

Host plants. Unknown.

**Remarks.** This new species is morphologically similar to *M. vacillans* Malaise, 1931 in having the postocellar area 2× broader than long; mesoscutellum entirely black; abdominal terga 2–3 with small white maculae laterally; dorsal side of hind tibia with a small white macula subapically.

#### 4. *Macrophya zhangae* Liu, Li & Wei sp. nov. (Figs 31–40)

<http://zoobank.org/4CAA4D6C-29DF-46F7-A9B5-C8668B63A1E6>

**Description.** Holotype, female (Figs 31–40). Body length 9 mm (Figs 31, 32).

**Color.** Body largely black; a small triangular macula at apex of labrum and palp largely pale blackish brown; following parts white: basal half of mandibles, apical half of clypeus, two small long maculae in posterior margin of postocellar area, posterior margin of pronotum, stripes in outer side of fore and middle coxae, apical parts in anterior side of fore and middle femur, stripes in anterior side of fore and middle tibiae, an oval macula in outer side of hind coxa, hind trochanter entirely, subapical parts in dorsal side of hind tarsomere 1, dorsal parts of hind tarsomeres 2–3, apical 1/3 in posterior margin of abdominal tergum 1 and two lateral sides with small maculae of abdominal terga 3–5; basal 2/3 of hind tibia, hind tarsomere 1 and tarsomeres 2–3 largely reddish brown. Body hairs silver, setae in ovipositor sheath blackish brown. Wings hyaline, below stigma with pale smoky macula but as broad as stigma and borderline fuzzy, stigma and veins largely blackish brown (Figs 31, 32).

**Punctuation.** Dorsal side of head not shiny, with coarse and dense punctures, without smooth interspace (Fig. 33); labrum and clypeus less shiny, with large and shallow punctures sparse, microsculptures weak (Fig. 34). Thorax not shiny, punctures on pronotum and mesonotum with minute and dense punctures, without smooth interspace, but with weak microsculptures; mesoscutellum with some large punctures and weak microsculptures; mesoscutellar appendage with coarse punctures and clear microsculptures (Fig. 36); mesepisternum with dense punctures, interspaces between punctures with fine microsculptures, upper half part with large punctures, lower half part with minute punctures; anepimeron not shiny, with coarse and clear wrinkles; anterior area of katepimeron strongly shiny, without punctures or microsculpture, other area with some large punctures and clear microsculptures, dorsal margin with some coarse punctures; metepisternum not shiny, with minute punctures; metepimeron less shiny, with clear punctures and microsculptures (Fig. 37). Lateral areas of abdominal tergum 1 with some shallow punctures and fine microsculptures, less shiny; basal 1/3 of abdominal terga 2–3 with punctures, apical 2/3 with very sparse punctures; bases of abdominal terga 4–8 with weak punctures, apical parts without puncture. Hind coxa and outer side of hind femur with minute punctures densely, microsculptures fine. Ovipositor sheath

coriaceous, apical margin with weak punctures and fine microsculptures.

Labrum weakly elevated, sub-square, apical margin truncate; clypeus elevated, base distinctly broader than distance between lower corner of eyes, anterior margin deeply arched, approximately incised to  $3/8$  length of clypeus, lateral corners slightly narrowed and long, apical margin obtuse roundly (Fig. 34); malar space  $0.4\times$  as long as diameter of median ocellus; frontal field slightly flat, not depressed, as high as top of eyes in lateral view; median fovea long punctiform, lateral foveae deep, furrow-like; interocellar furrow and postocellar furrow weak; POL : OOL : OCL = 20 : 42 : 23; postocellar area slightly elevated,  $2\times$  broader than long (46 : 23), anterior  $1/3$  of lateral furrows shallow, posterior  $2/3$  of lateral furrows deep, divergent backwards; narrowed behind eyes in dorsal view, occipital carina complete (Fig. 33). Antenna slender, as long as combined head and thorax together, shorter than abdomen (42 : 55); antennomere 2 approximately  $1.2\times$  broader than long, antennomere 3 shorter than combined antennomeres 4 and 5 together (72 : 85), subapical antennomeres dilated and weakly compressed, antennomeres 6–9 reduced, the ratio of antennomeres 3–9 as 72 : 45 : 40 : 30 : 28 : 25 : 30 (Fig. 35). Mesoscutellum roundly elevated, with lower peak and lateral carinae, as high as top of mesonotum in lateral view; mesoscutellar appendage with a lower and short median longitudinal carina; lower part of mesopleuron weakly elevated, dorsal-posterior platform of mesepimeron as broad as diameter of median ocellus; metepimeron without appendage, posterior corners obtuse roundly; distance between cenchri approximately  $2.3\times$  as long as breadth of a cenchrus; mesopleuron and metapleuron as shown in Fig. 37. Inner tibial spur of hind leg approximately  $0.67\times$  as long as metabasitarsus (28 : 42), metabasitarsus slender, slightly longer than following 4 tarsomeres together (42 : 38); claw with inner tooth shorter than outer tooth. Fore wing with vein cu-a joining cell 1M at basal  $1/3$ , vein 2r joining cell 2Rs at apical  $1/5$ , anal cell with a petiole in fore wing, slightly longer than vein 1r-m; anal cell with a petiole in hind wing  $1/3$  length of vein cu-a. Ovipositor sheath longer than middle tibia (55 : 40), shorter than metabasitarsus (55 : 60), apical margin slightly acute roundly, valvula 3 as long as valvifer 2, ovipositor sheath in lateral view as shown in Fig. 38. Lancet with 18 serrulae (Fig. 39), serrulae slightly oblique, middle serrulae each with 1 proximal and 4–7 distal teeth, subbasal tooth slightly large, annular spine bands not broad, spines sparse, 6th–9th at base as shown in Fig. 40.

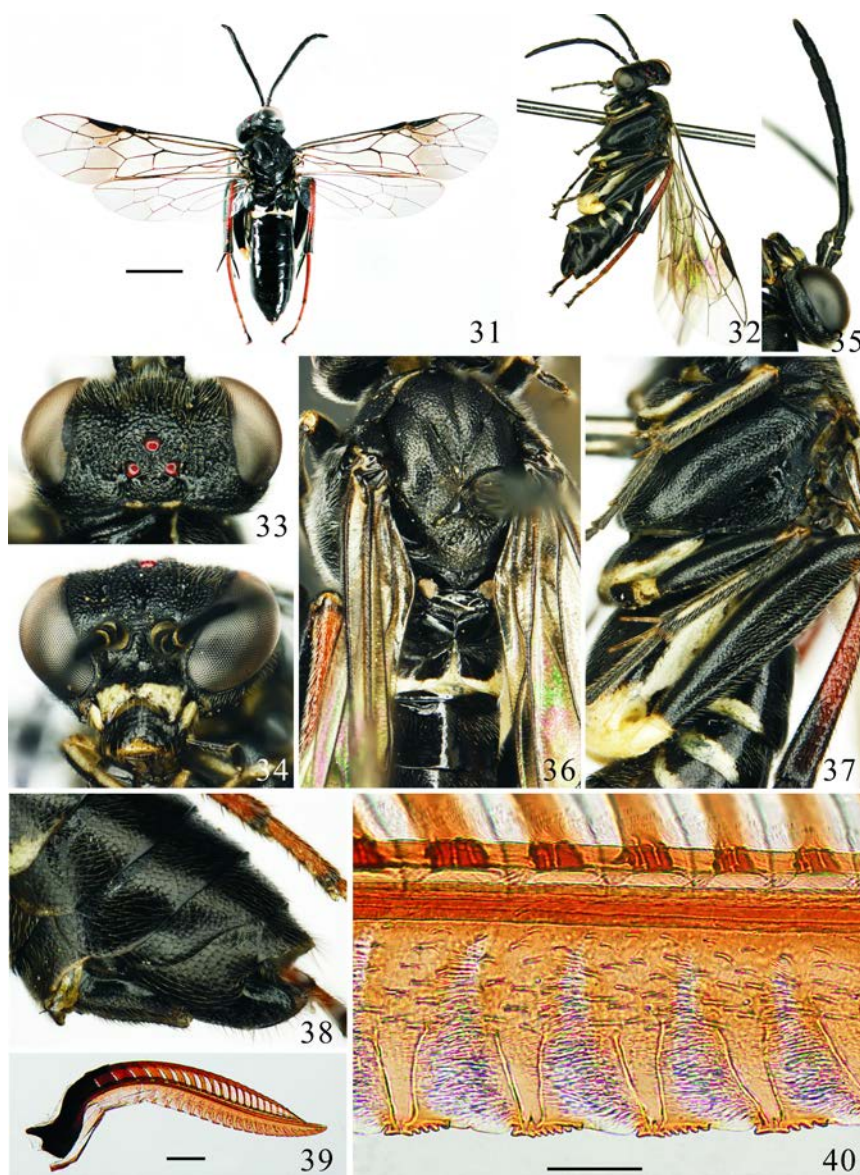
Male. Unknown.

**Holotype.** ♀, **China**, Shaanxi, Mei County, Mt. Taibai, Kaitianguan, N.  $34^{\circ}0.572'$ , E.  $107^{\circ}51.477'$ , alt. 1852 m, 02-VI-2018, ethyl acetate, leg. Shuxin LIU & Yiwen ZHANG (CSCS18045), ASMN.

**Etymology.** The new specific epithet “*zhangae*” is derived from the surname of Miss. Yiwen ZHANG who collected the holotype of this new species.

Host plants. Unknown.

**Remarks.** This new species is morphologically similar to *M. minutiluna* Wei & Chen, 2002 in having the basal half of labrum black, apical half white; middle serrulae of lancet each with 1 proximal and 4–7 distal teeth; lateral sides of abdominal tergum 5 with long maculae distinct; fore wing with vein 2r joining cell 2Rs at apical  $1/5$ , anal cell with a petiole in hind wing  $1/3$  length of vein cu-a; subapex with a small white macula of hind tibia dorsally, apical  $1/3$  of hind tibia dark reddish brown to black, basal  $2/3$  of hind tibia reddish brown.



Figures 31–40. *Macrophya zhangae* sp. nov., ♀, holotype. 31. Adult, dorsal view; 32. Adult, lateral view; 33. Head, dorsal view; 34. Head, frontal view; 35. Antenna, lateral view; 36. Thorax, dorsal view; 37. Thorax, lateral view; 38. Ovipositor sheath, lateral view; 39. Lancet; 40. 6th–9th serrulae. Scale bars = 2 mm (Fig. 31); 200  $\mu$ m (Fig. 39); 50  $\mu$ m (Fig. 40).

This new species is also morphologically similar to *M. pseudominutiluna* sp. nov. in having the postocellar area 2.4 $\times$  broader than long; fore wing with vein 2r joining cell 2Rs at apical 1/5, anal cell with a petiole in hind wing 1/3 length of vein cu-a; lateral sides of abdominal tergum 5 with long maculae distinct; middle serrulae of lancet each with 1 proximal and 4–7 distal teeth, subbasal tooth slightly large.

## Discussion

The *Macrophya sanguinolenta* group originally proposed by Wei *et al.* (2013) is the largest of the defined species groups of *Macrophya* Dahlbom, 1835 in terms of known species. At present, there are 45 species belonging to this group in China, including the four new species described above. The included key and geographical distribution map of the *M. sanguinolenta* group (Fig. 41) should facilitate the recognition and identification of the Chinese species. In addition, habitat figures of these new species collection site at Mt. Shennongjia in Hubei and Mt. Taibai in Shaanxi, China are also provided (Figs 42, 43).



Figure 41. Geographical distribution map of the *Macrophya sanguinolenta* group in China.  
(• refers to specific distribution points of species in the *Macrophya sanguinolenta* group)





Figures 42, 43. Habitat of the species collection site from Mountains Qinling, China. 42. Mountain Shennongjia, Hubei; 43. Mountain Taibai, Shaanxi.

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